B.2 15 JANUARY 1973

A deep, upper air trough over the eastern Mediterranean Sea, coupled with a blocking high over central Europe, forced cold air southward to the rear/west of the upper trough axis through a deep layer. (The direction of the geostrophic wind at 500 mb is typical, in this instance, of the wind direction through the surface-500 mb layer.) The cold air in the lower layers of the atmosphere was advected first southward over the western portion of the Taurus Mountains and through the Aegean Sea; then eastward over and around the mountains of the narrow, coastal mountain range of Syria and Lebanon on the eastern Mediterranean shore, into the upper Euphrates Valley. This less direct route of cold air penetration is traced on Figure B-2. A tongue of -25°C to -30°C air was also advected eastward at 500 mb (see Figures B-3 and B-5) with the upper trough.

Figure B-6 comprises a surface chart (a) and satellite images (b) for 15 Jan. The DMSP visible image near noon local time (approximately 15/08Z), Figure B-6b, shows the "signature" of the cumulus that formed as the colder air in the lower layers of the atmosphere streamed over the warmer waters of the eastern Mediterranean following passage over the eastern portion of the Taurus Mountains and through the Aegean Sea. As the lower layers of the deep, cold, northerly airstream were warmed from below by contact with the comparatively warm Mediterranean Sea, the airstream as a whole became unstable and cumulus developed downstream (area A on Figure B-6b).

The satellite image also shows the surface low, area B, and the associated cold front, band C. Band D shows the subtropical jet slightly to the north of its climatological position, curved anticyclonically to the northeast of the Gulf (see also 200 mb analyses at 15/00Z and 15/12Z, Figures B-7 and B-8).

The cold front advanced rapidly southeastward down the Tigris-Euphrates valley at nearly 40 kt. This movement is shown by comparison of frontal positions on the surface analyses for 15/00Z and 15/12Z, Figures B-4 and B-6a, respectively. The 15/12Z surface analysis shows such movement to be supported by 30-40 kt surface winds in northern Saudi Arabia (Figure B-6a). The speed of movement of the cold front is comparable to that described in Case Study 1, Appendix A.